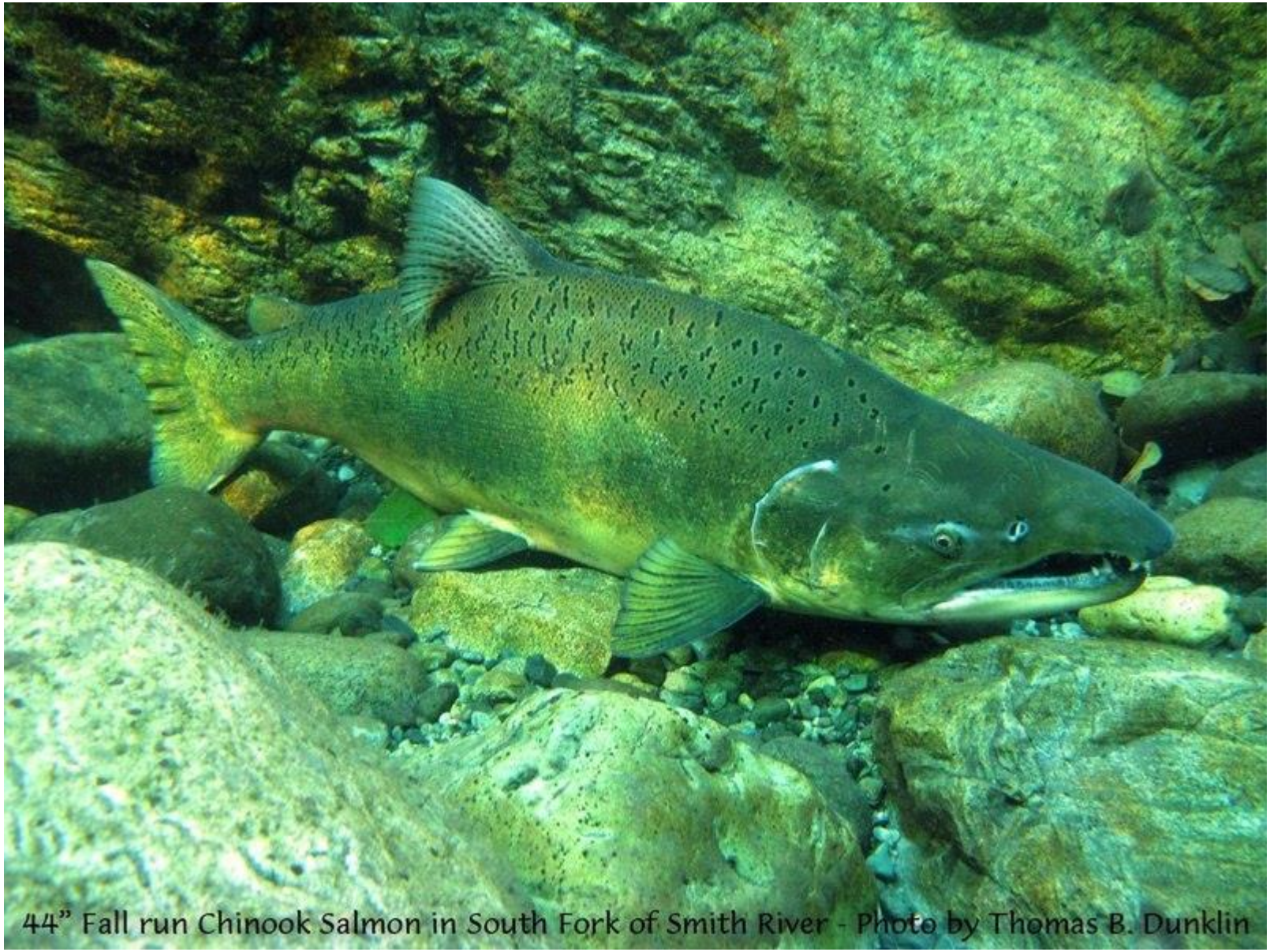
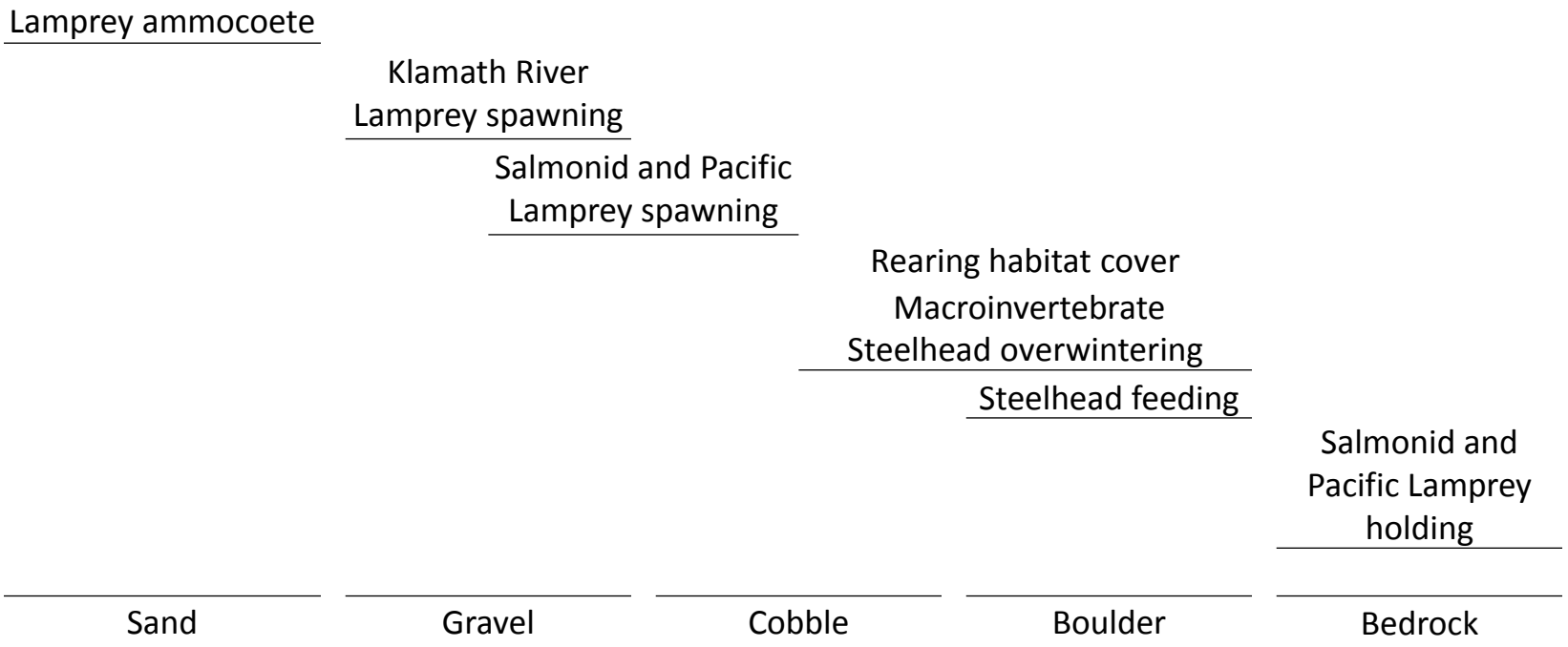
Fish and Substrate in the Trinity River

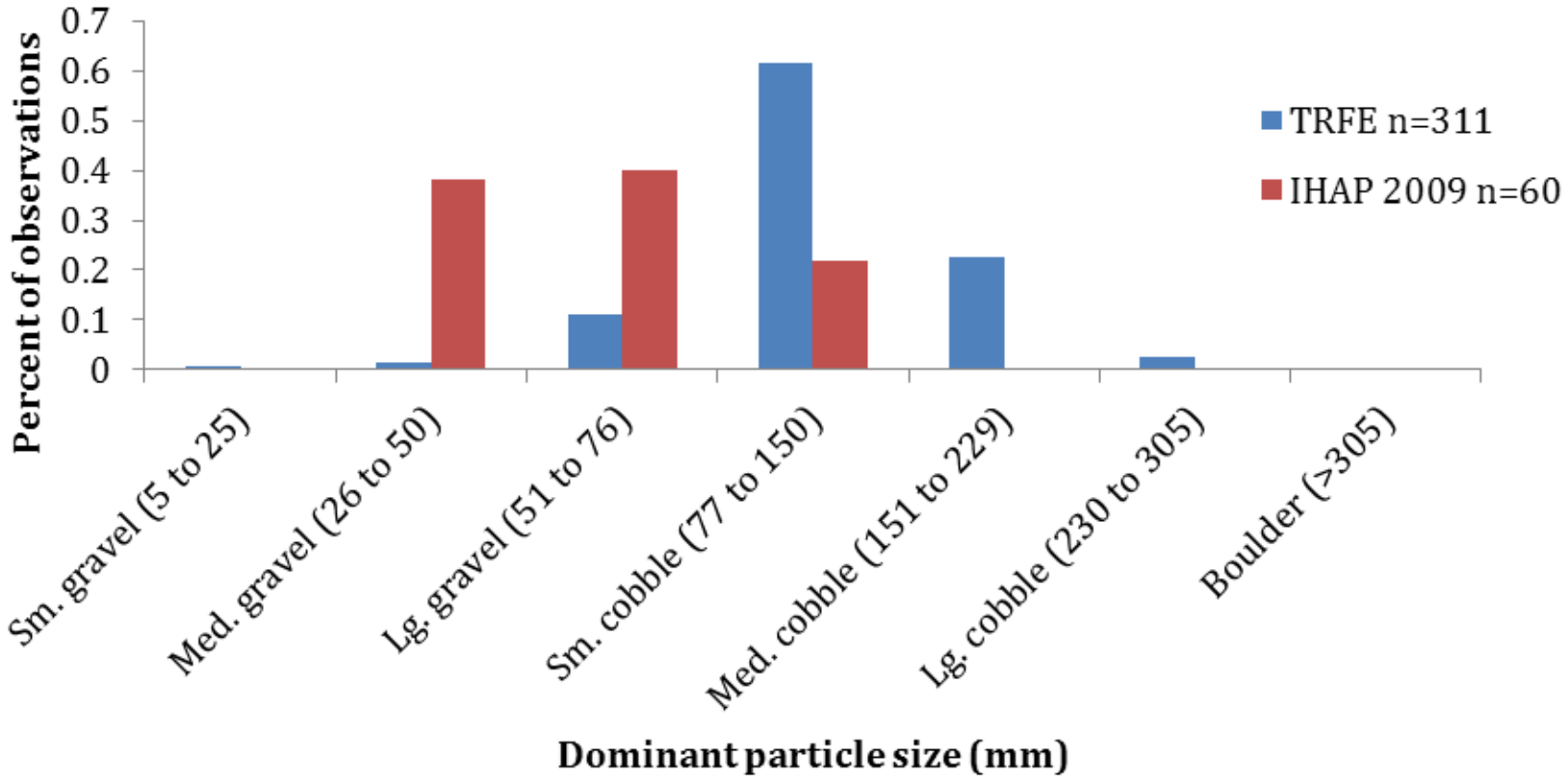


Fish to Substrate Relationships



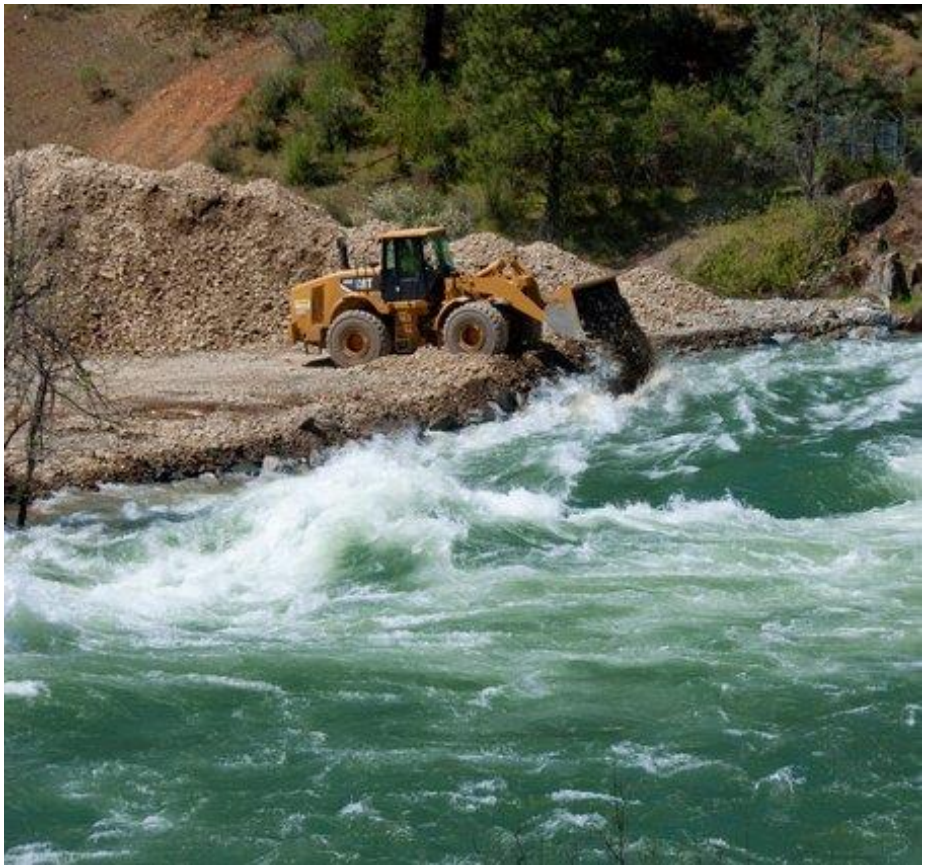
- Direct relationships between fish and substrate

Shifts in Chinook Salmon Spawning Substrate Use Since TRFE



Augmentation

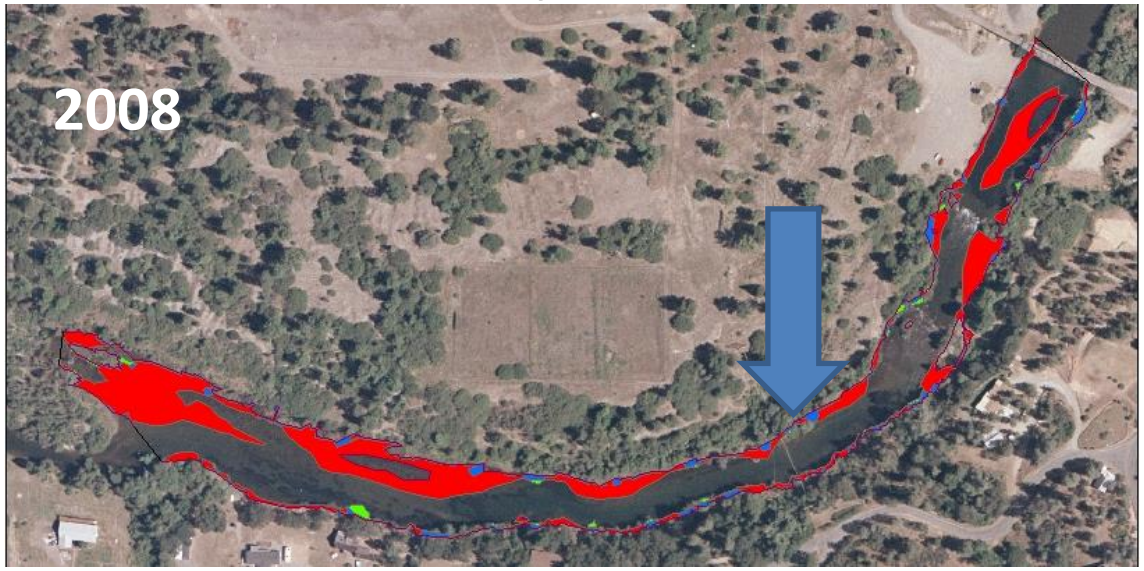
High Flow



Low Flow

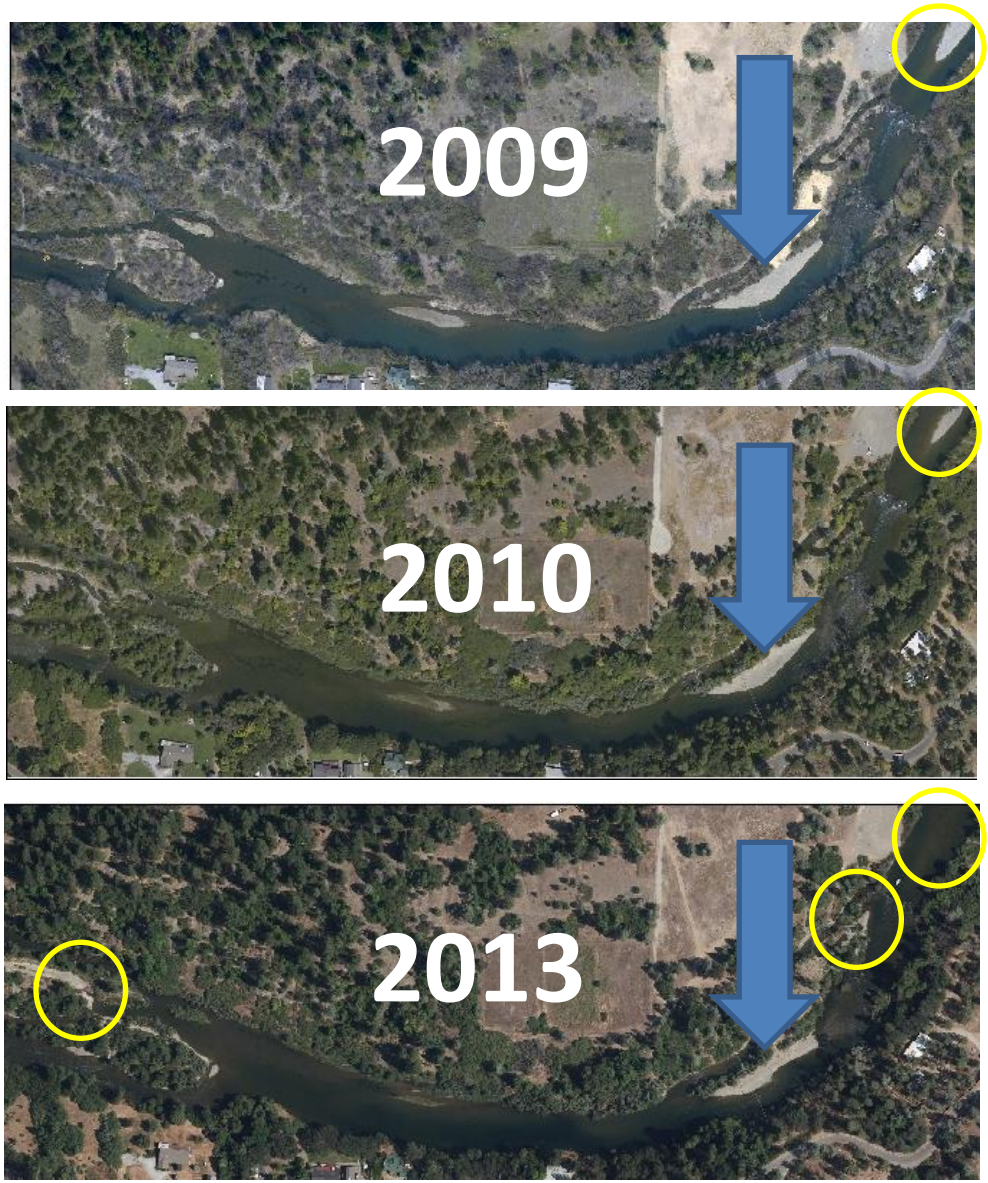
- Indirect -> facilitate fluvial process to increase channel complexity and habitat
  - Interactions with channel rehabilitation site construction

Hoadley
Pre-construction / Post Construction



Hoadly Gulch Evolution

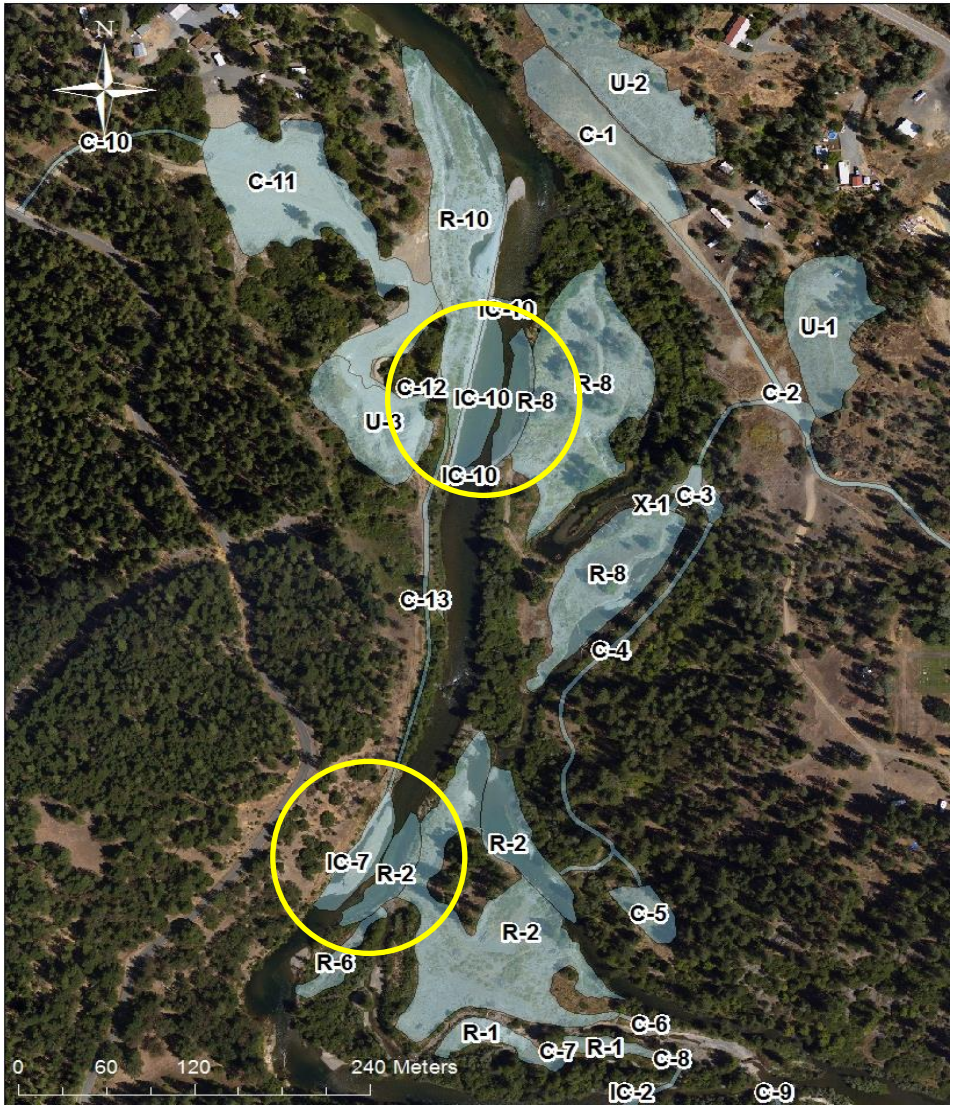
- Constructed Bar has persisted
- The bar has been altered by the 2011 Rod Flow release
- Gravel is being routed through the site. Evidence of the scour of a mid-channel bar upstream Show that
- Effect on rearing habitat from the bar remains minimal



Sawmill Main Channel

Three bars built during construction:

- Low flow gravel augmentation
- IC-2, IC-7, and IC-10
- IC-7 and IC-10 accompanied by R-2 andR-8 channel meanders



Sawmill Revist

Post-construction – Modest increases in rearing habitat

Revist – Habitat decreases to below pre-construction levels

IC-7 persists

- Major habitat contribution of the down steam alcove is now disconnected at base flow
- Channel meander persists
- Hard points in the form of wood where added during the summer of 2013

Sawmill Revisit (IC-10)

Post-construction:

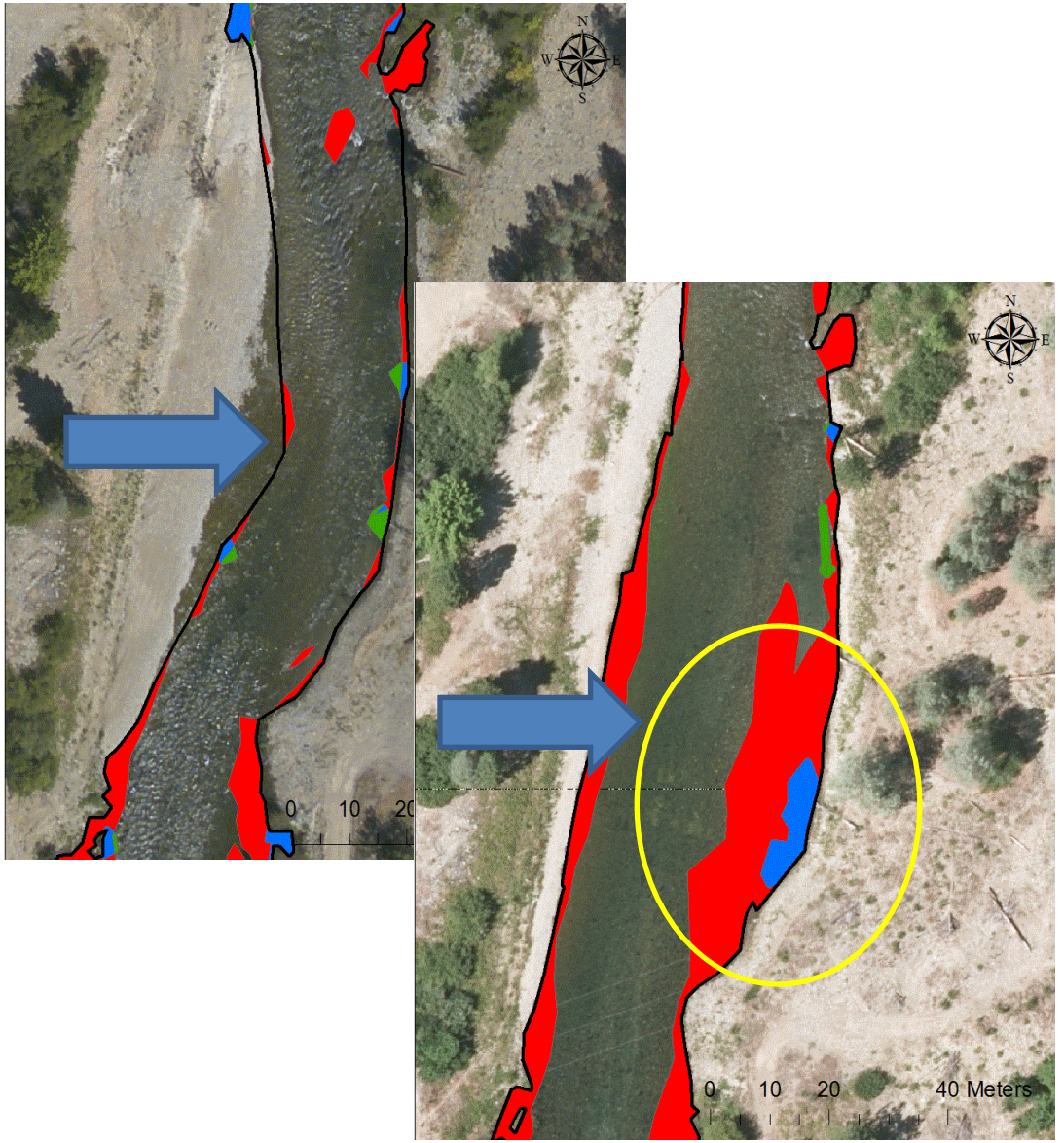
- Minimal habitat gains

Revisit:

- Bar is gone
- Modest habitat increase in area of R-8 channel meander

Result:

- Unintended

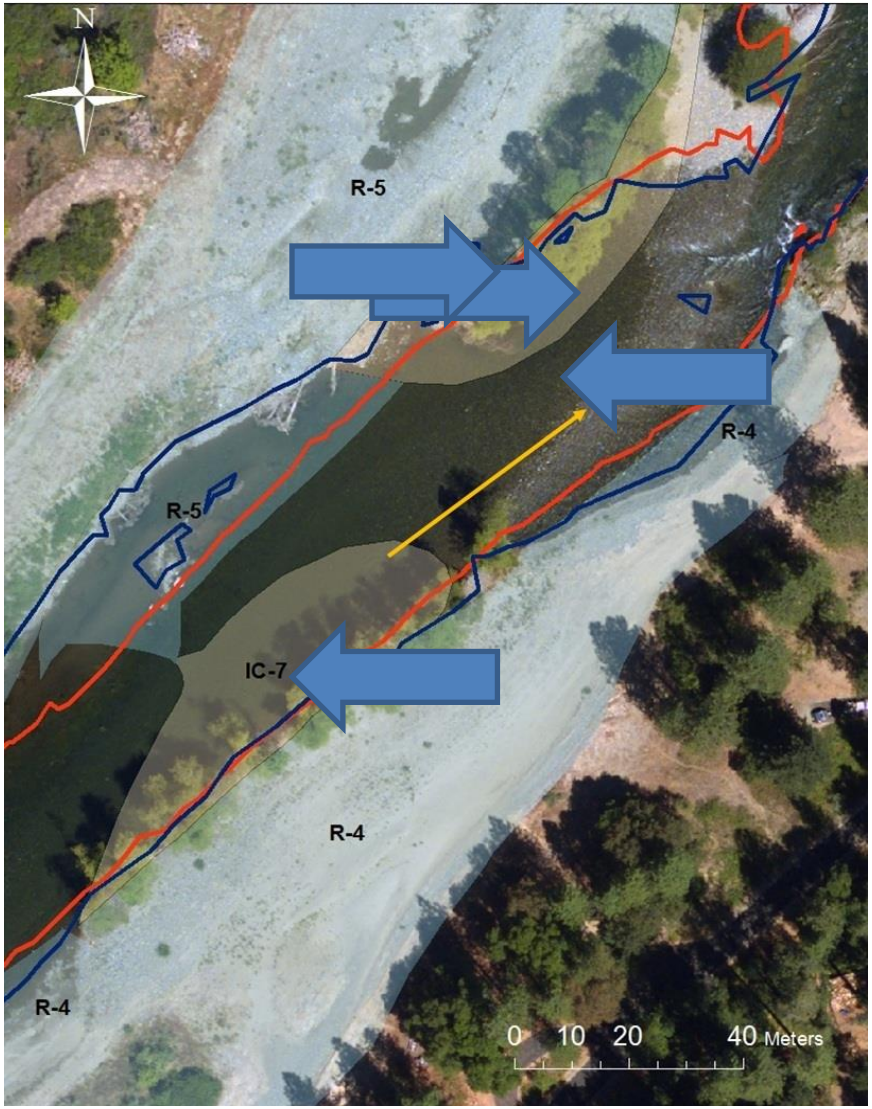


Lower Reading Creek

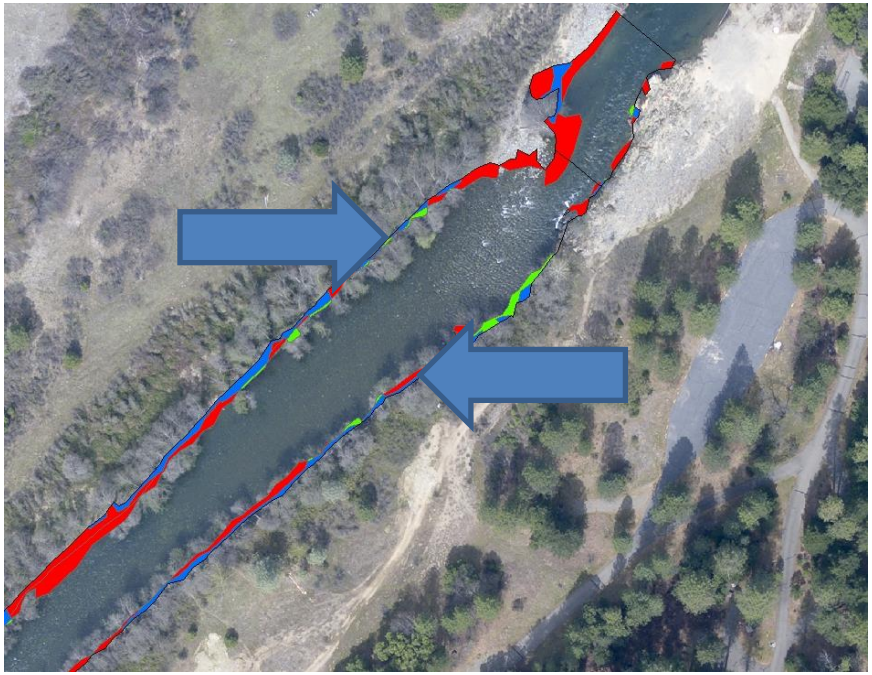
Low flow gravel augmentation prescription:

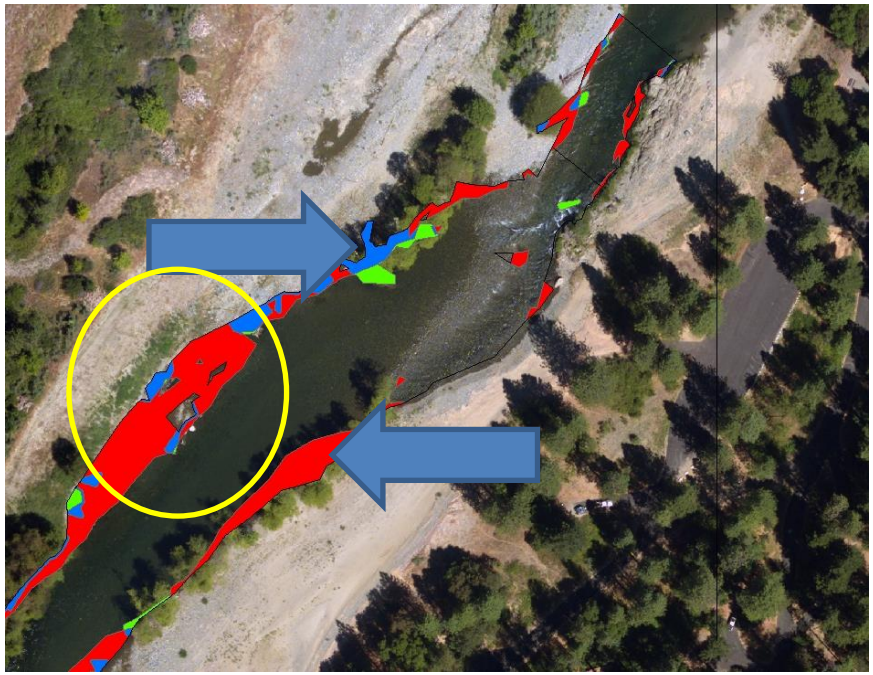
- Alternating bars IC-7 and IC-8

- Accompanied by R-5 and R-4 floodplain lowering and Channel meander



Lower Reading Creek Habitat Results
Pre-construction / Post-construction





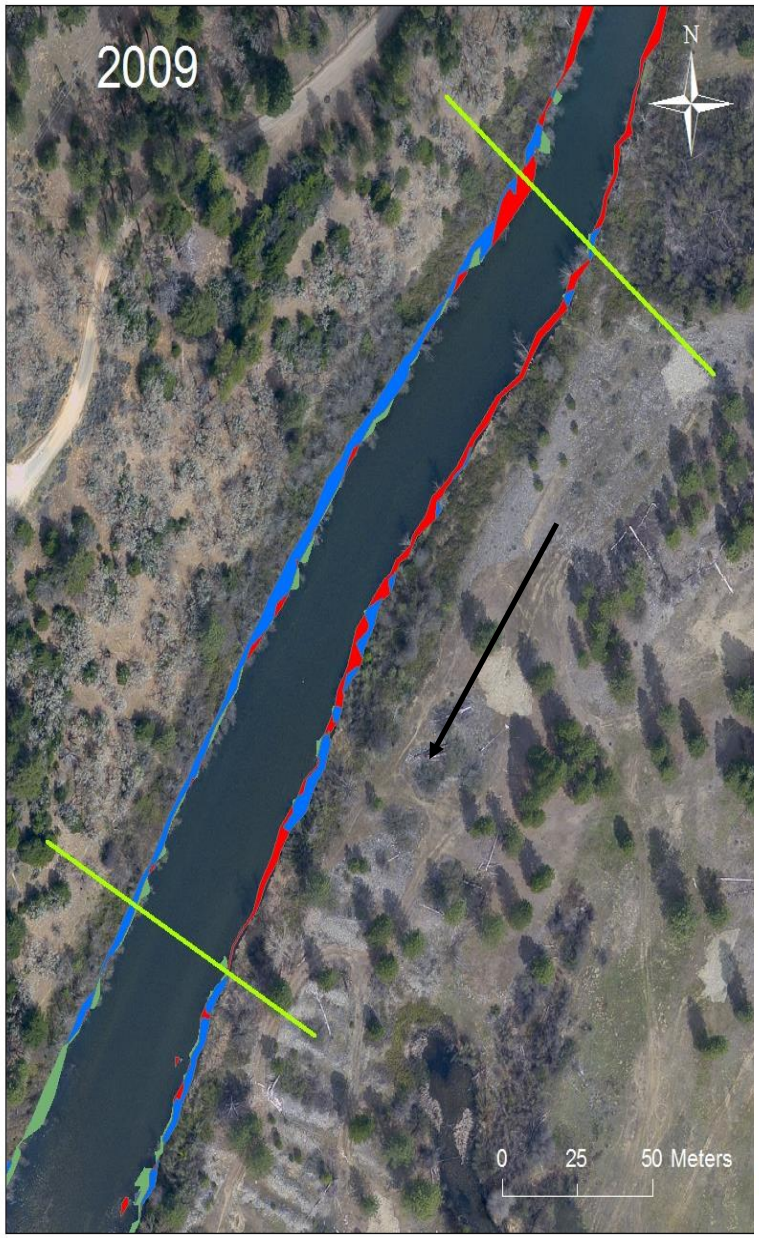
Pre-construction:

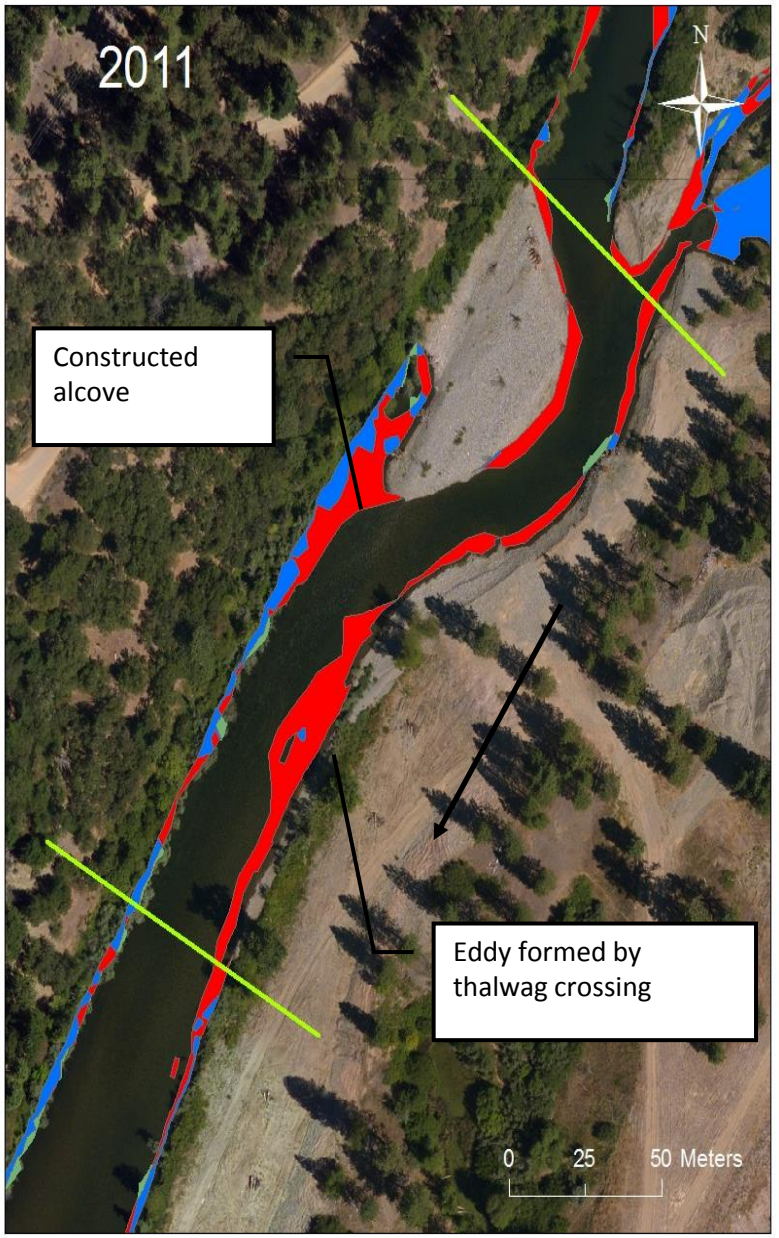
- Location of alternating bars to be constructed

Post-construction:

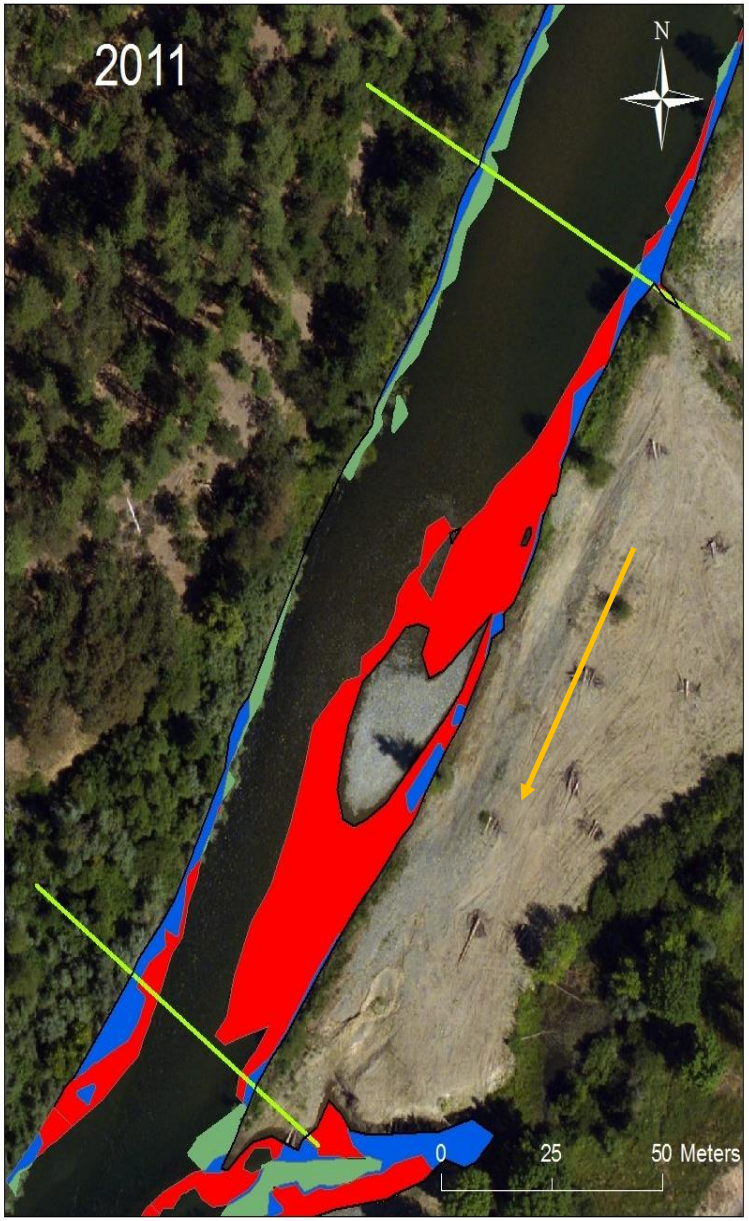
- Alternating bars did not persist
- No evaluation of habitat change was done in the area of IC-7 and IC-8 change is due to R-5 channel meander

Lowden Meadows -> Constructed Bar





Lowden Meadows -> Bar Formation at Rehab Site



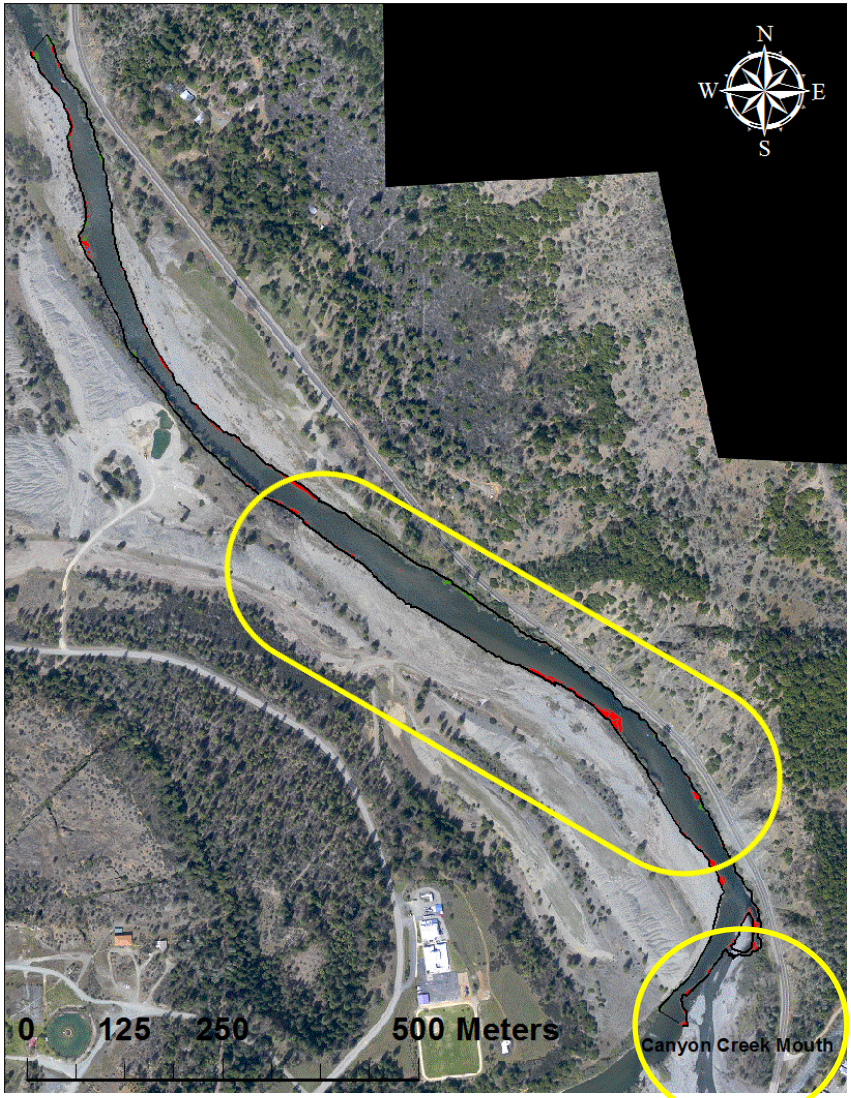
Hocker Flat

Construction:

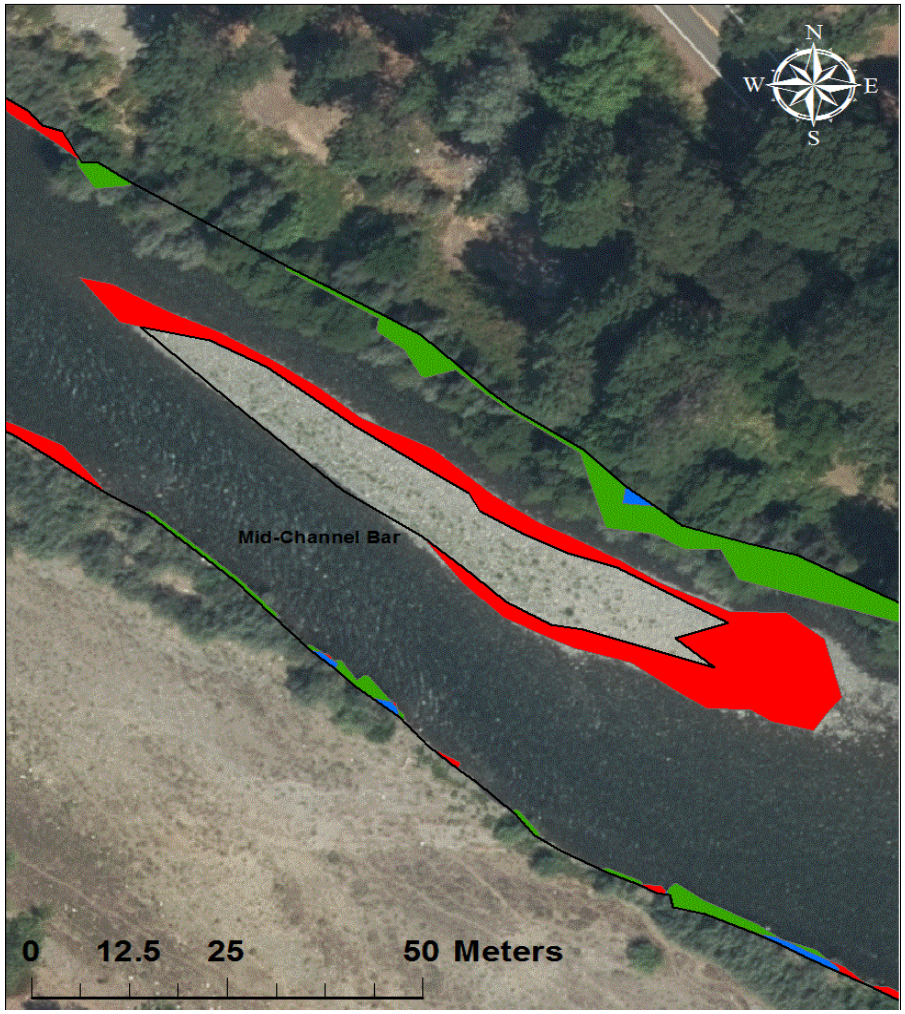
- Removal of riparian berm
- Constructed feathered edge
- Floodplain lowering

Natural sediment source:

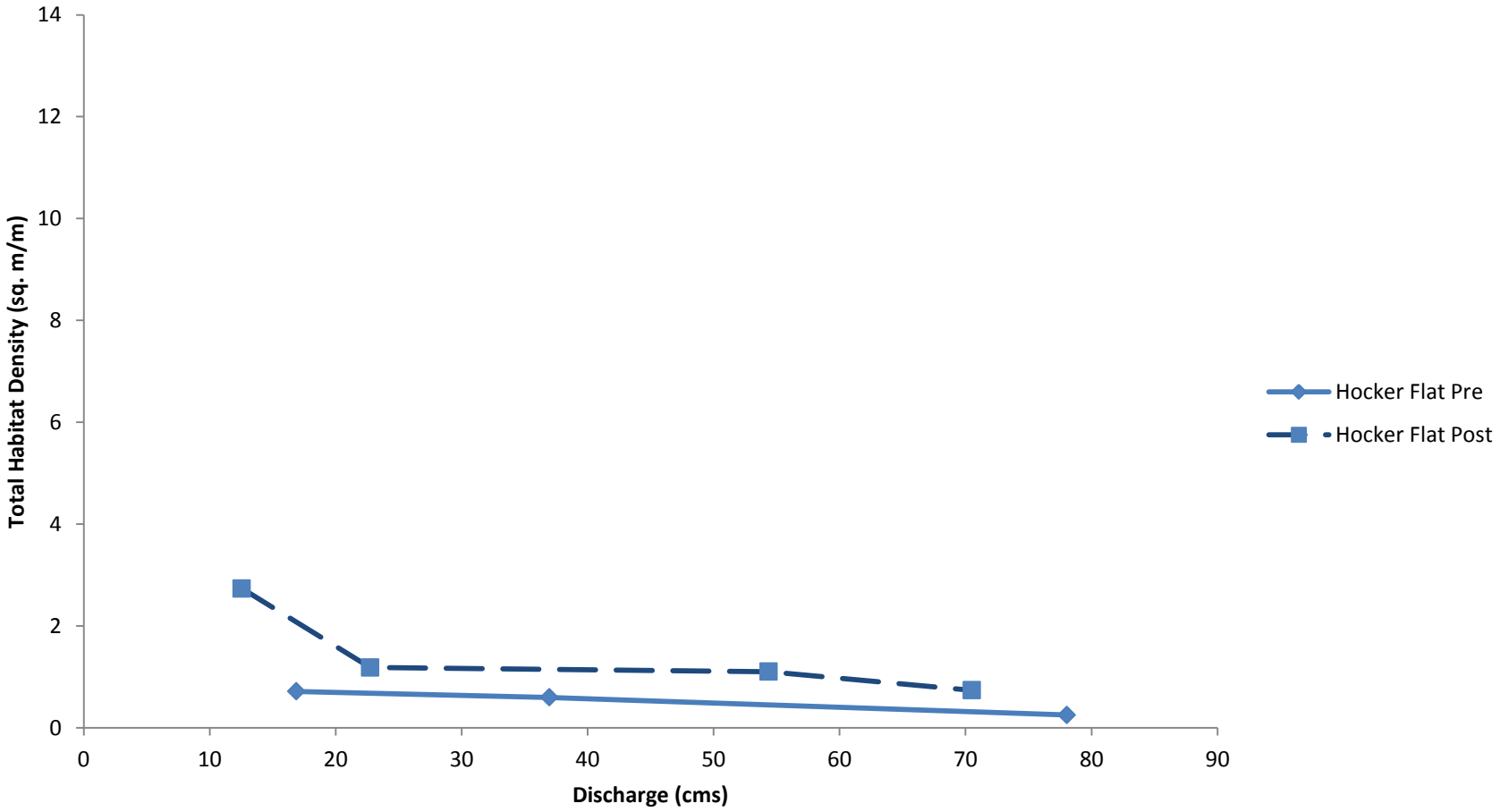
- The confluence of the Trinity with Canyon Creek is at the upstream end of the site



Natural Mid Channel Bar Formation



Hocker Flat Total Habitat Pre vs Post



Lewiston Cable Way

Four bars were constructed

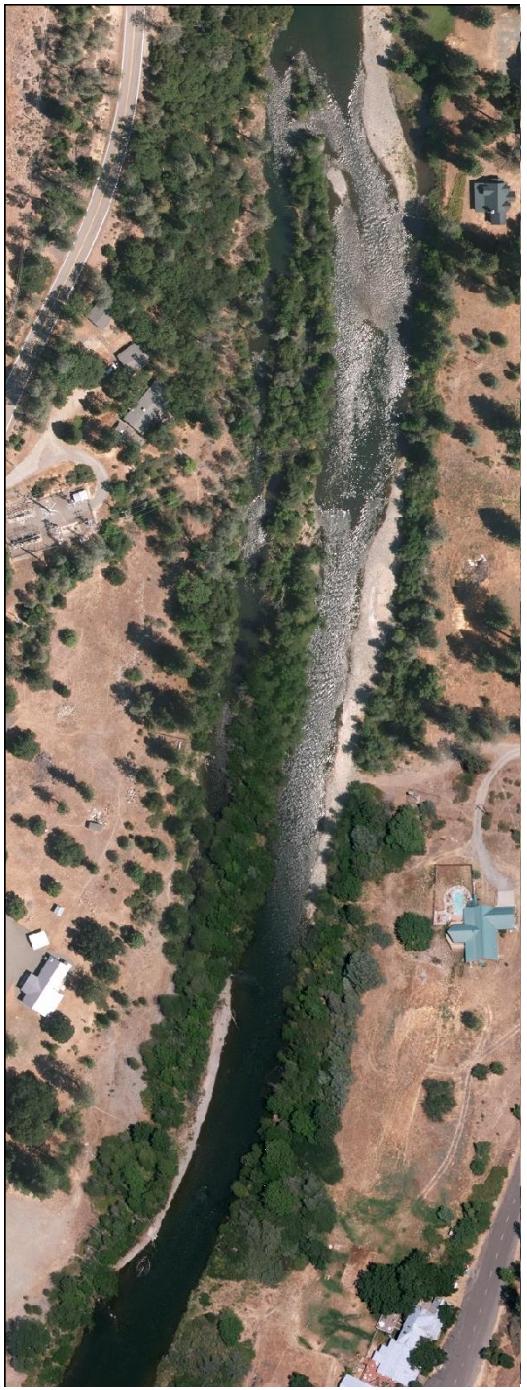
Post-construction main channel

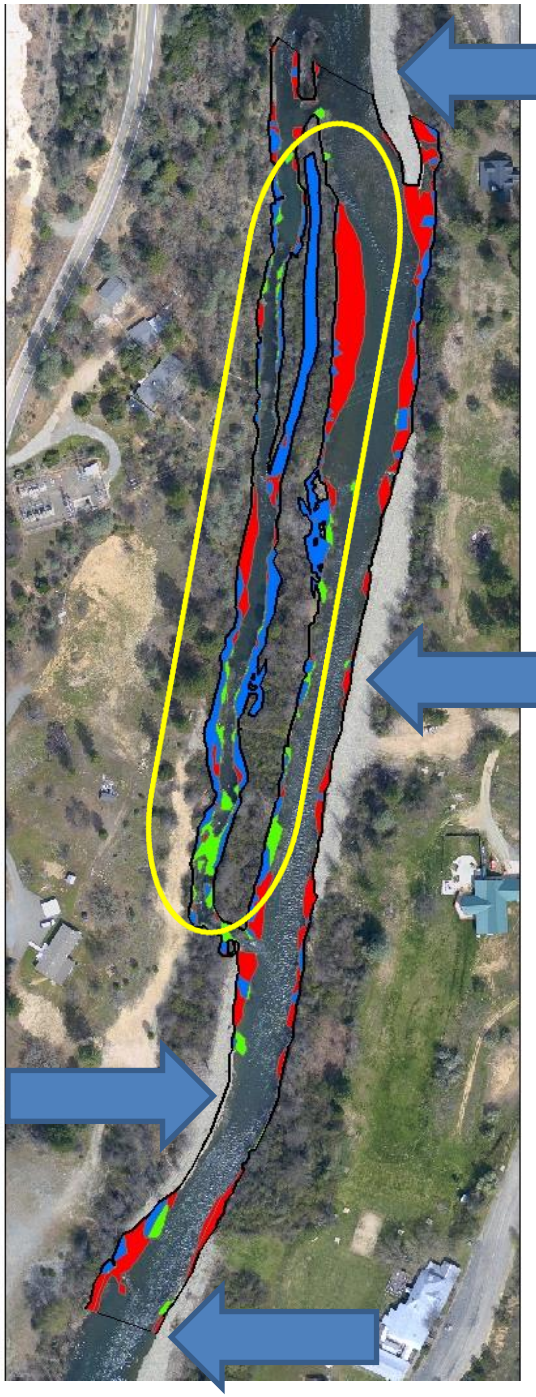
- Upstream bars persist
- Made of over sized material

Presmolt rearing habitat:

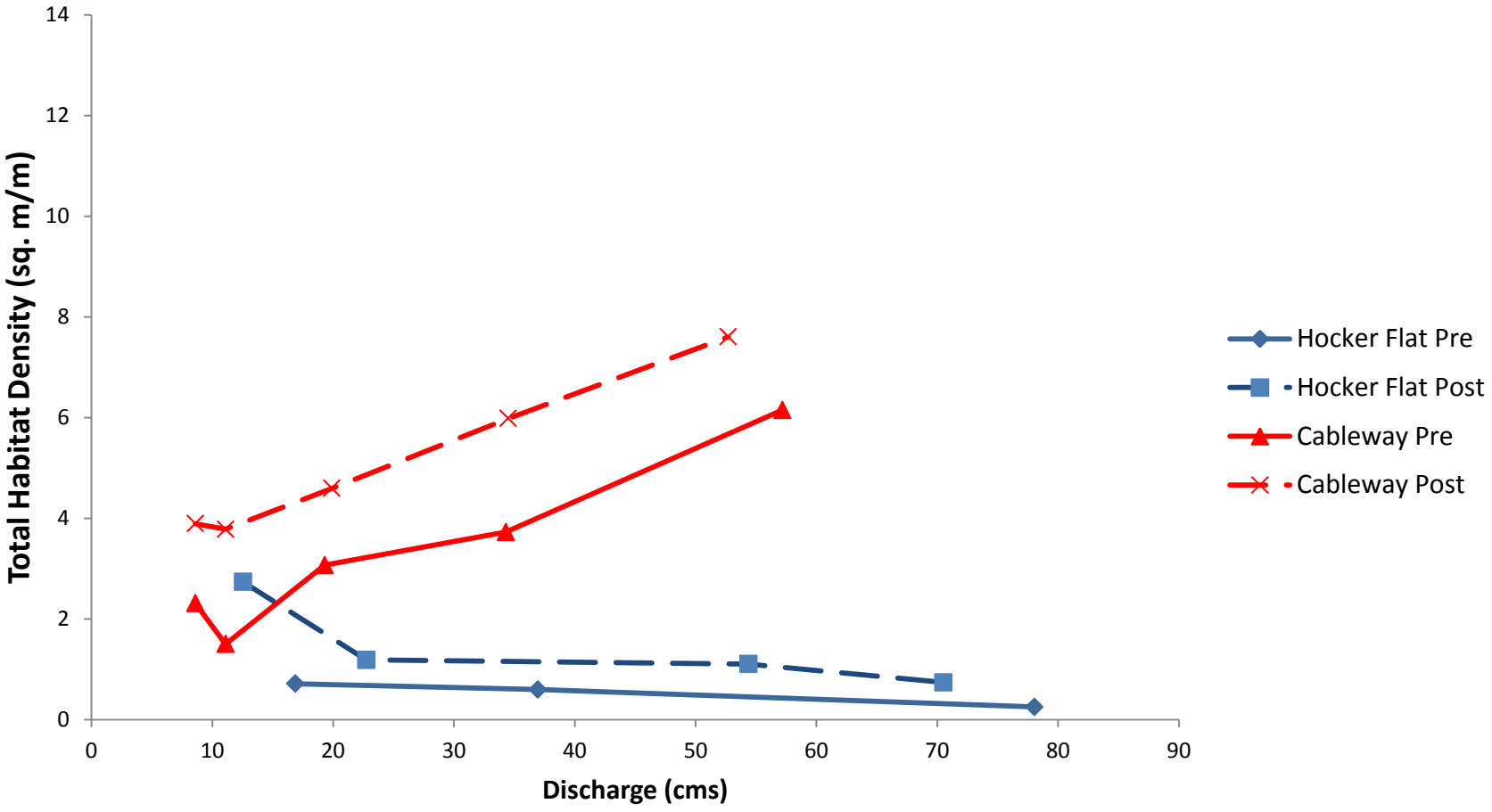
- Small decrease

At base flow bar creation had minimal impacts on rearing habitat





Cableway Site Pre vs. Post

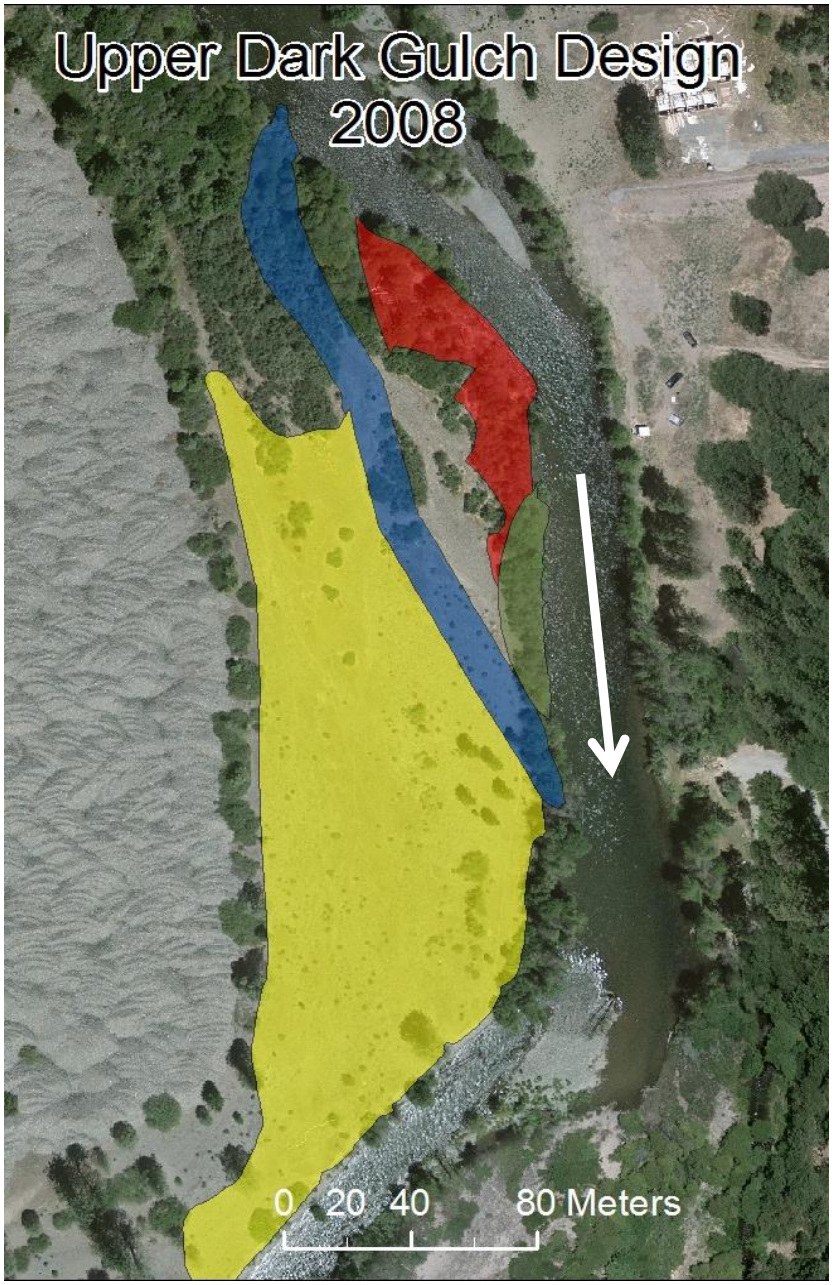


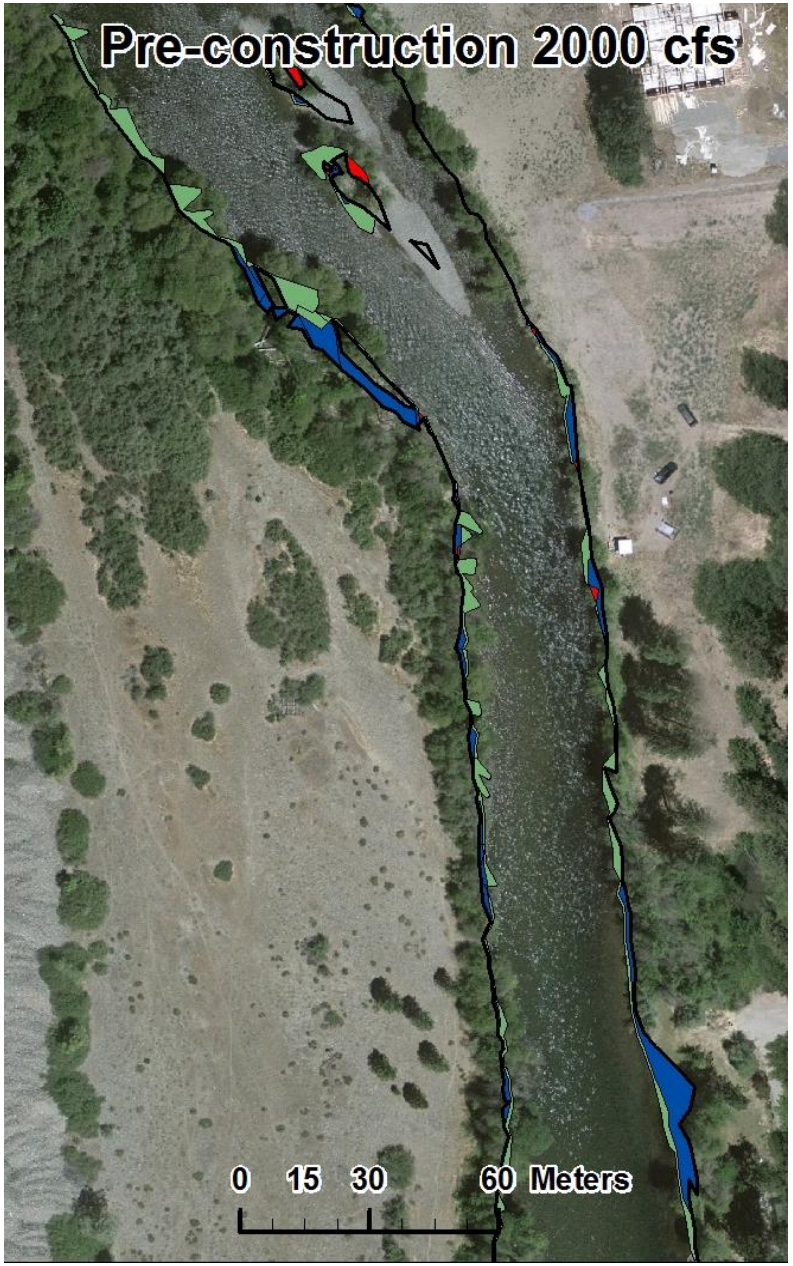
Upper Dark Gulch Project Design

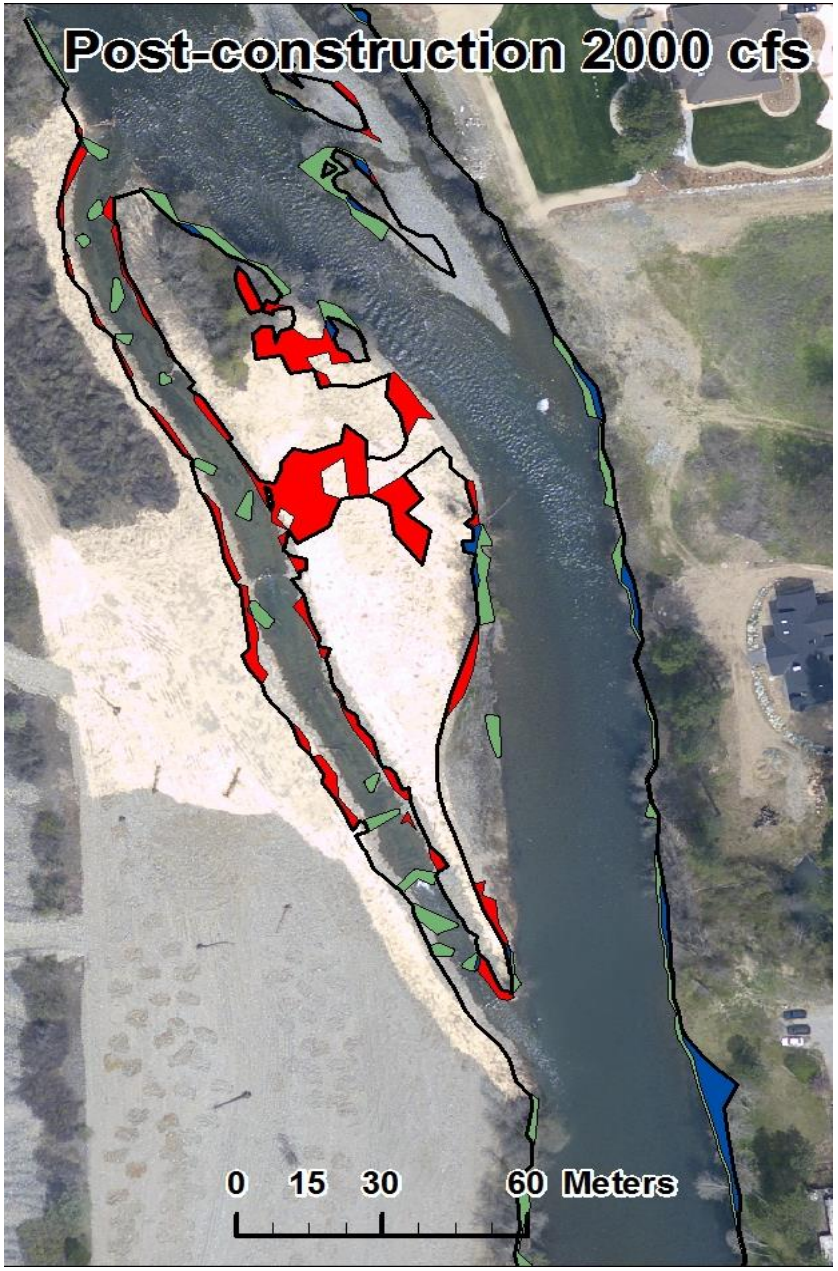
Project Goal- Increase salmonid rearing habitat at all flows

Design Elements include:

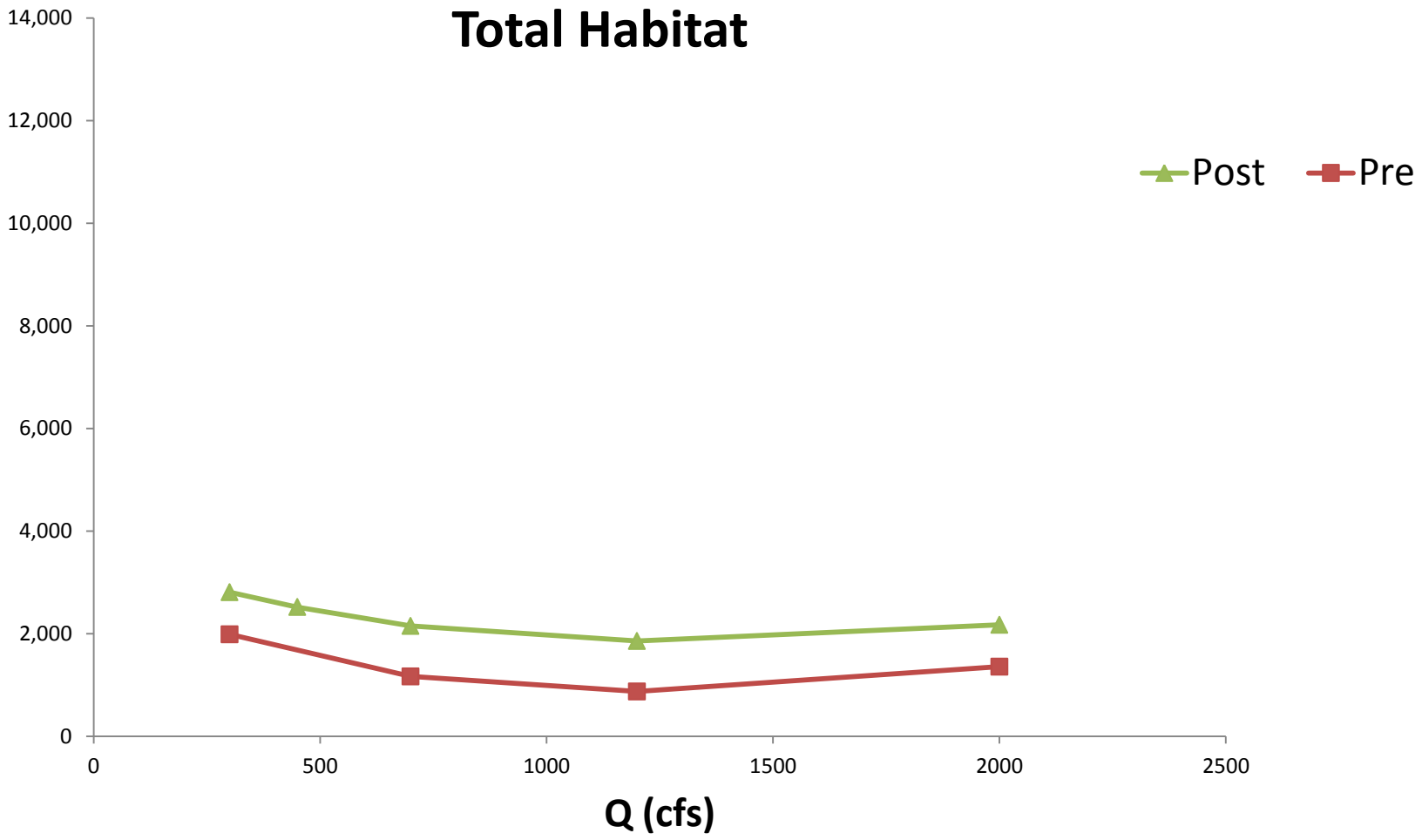
- Berm Removal
- Floodplain lowering
- Side channel creation
- Addition of large wood and riparian plantings
- 24,000 CY excavation
- NO BAR CONSTRUCTION




Pre-construction 2000 cfs
0 15 30 60 Meters

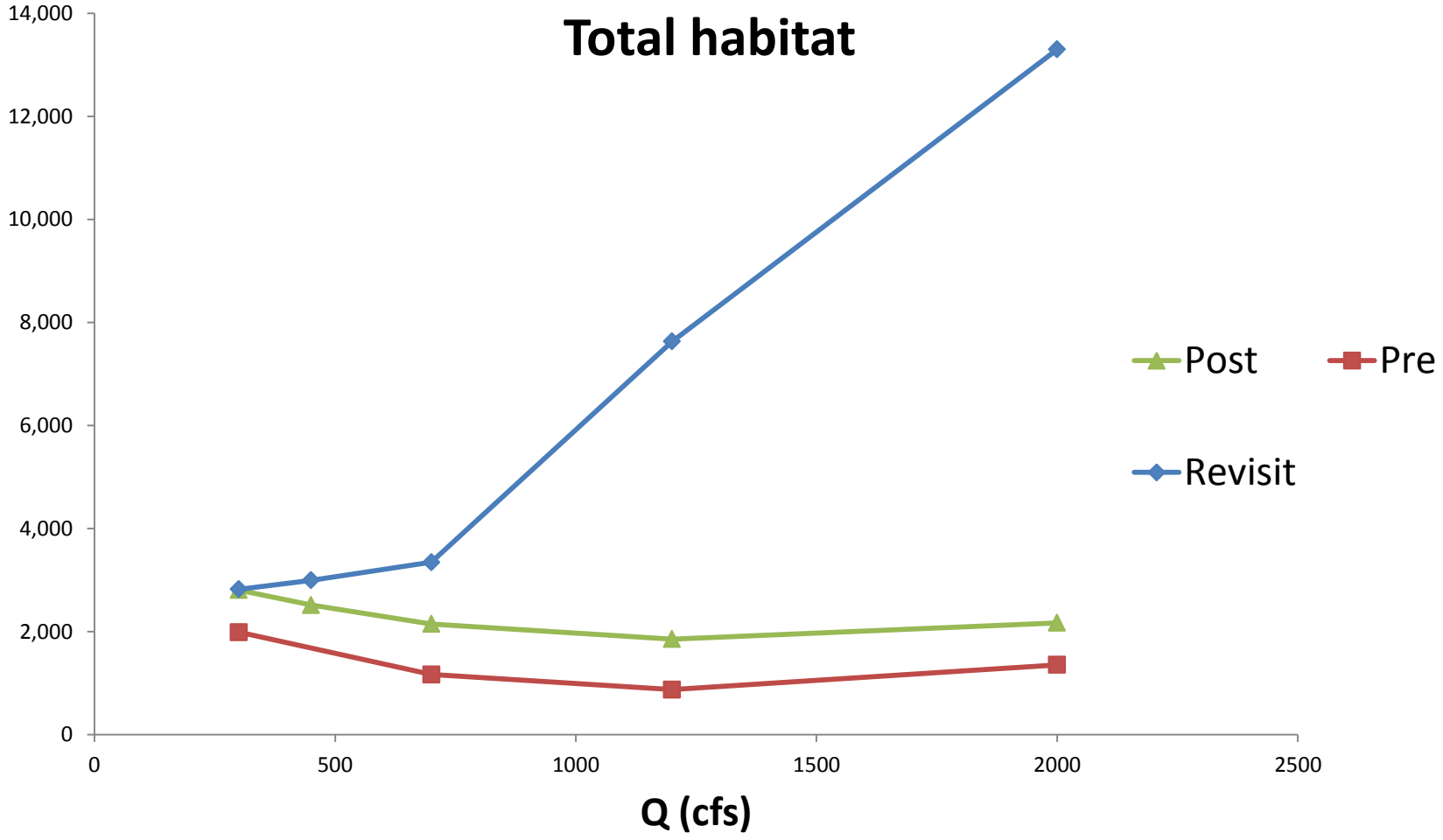

Post-construction 2000 cfs
0 15 30 60 Meters

Upper Dark Gulch
Pre vs Post-construction



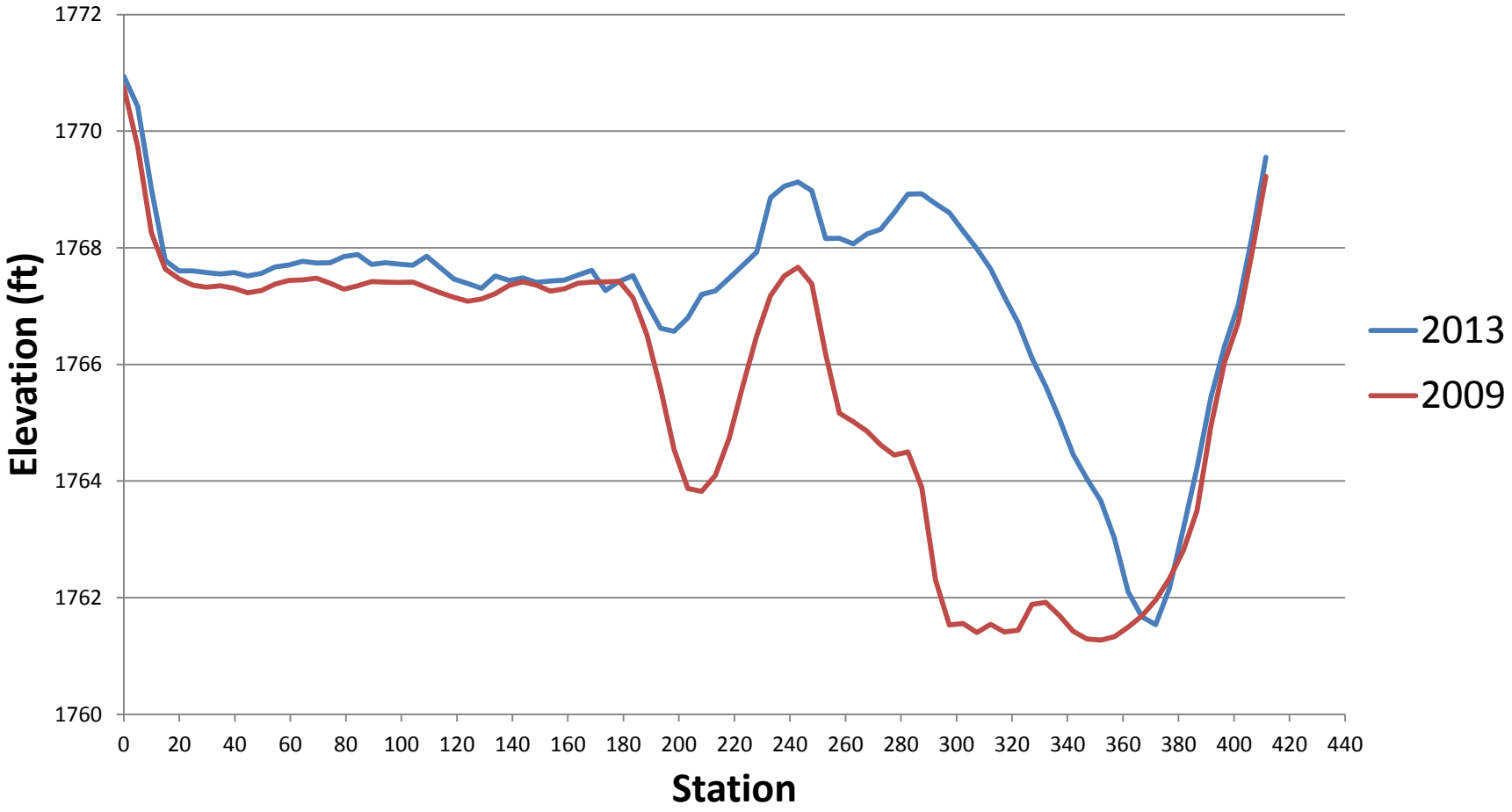
2011 High Flow

Upper Dark Gulch
Revisit (post high flow)

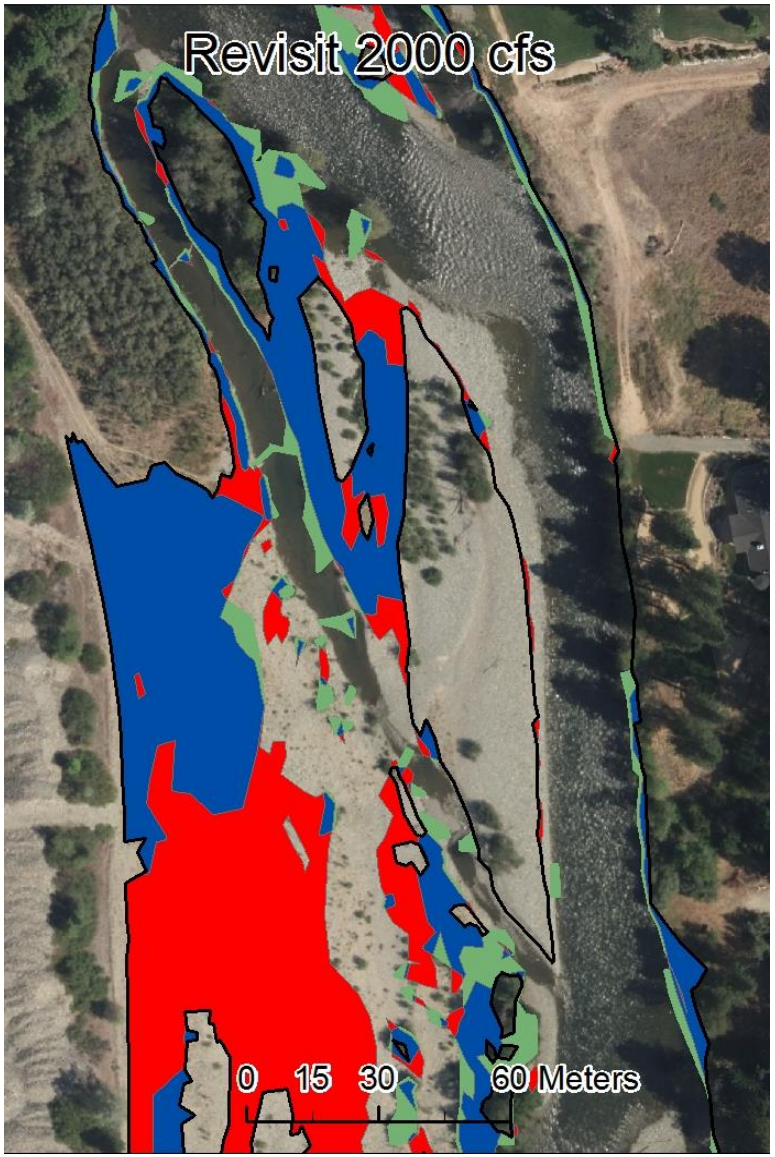


What Happened?!?

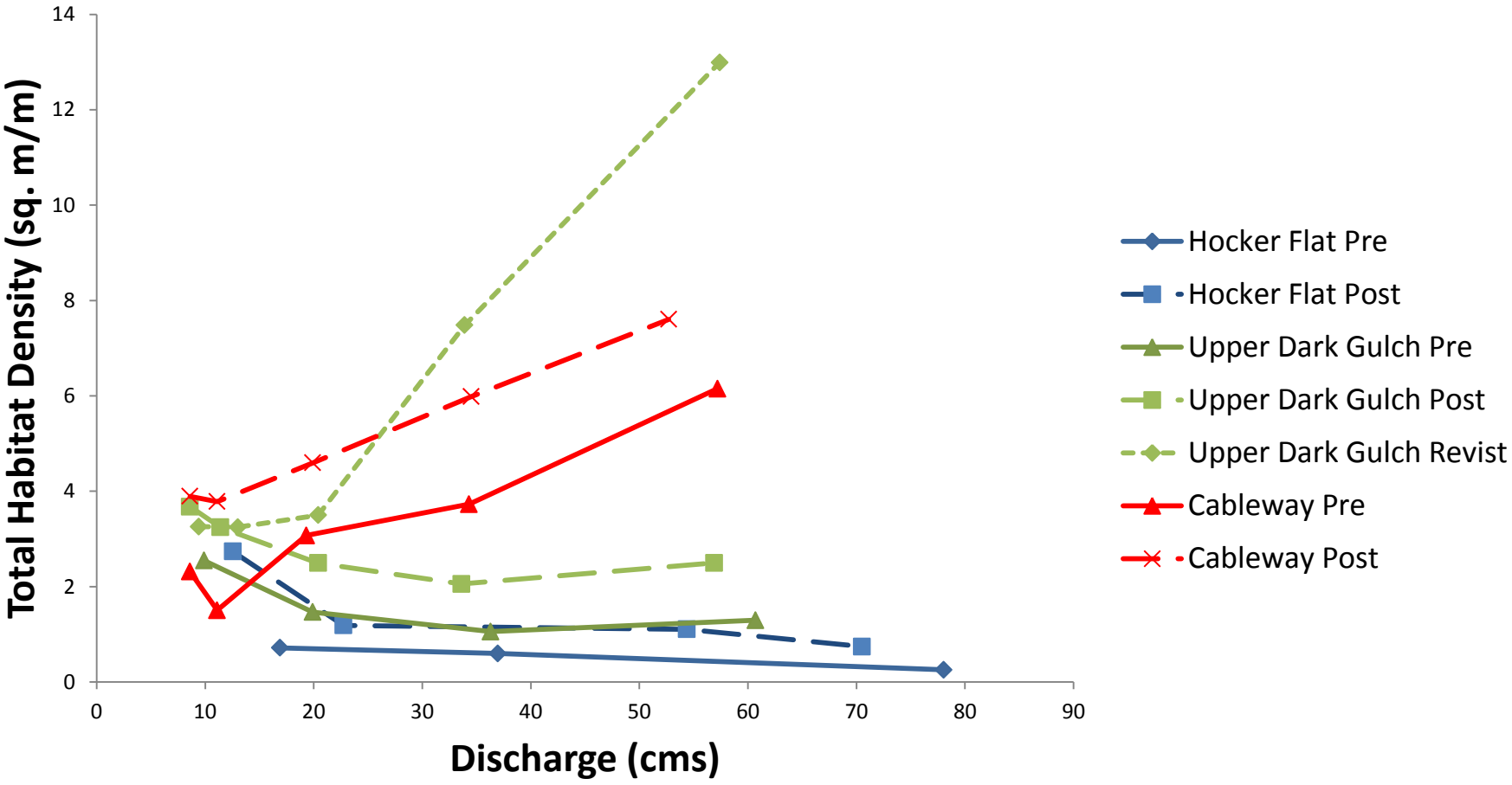
Cross section profile




Post-construction 2000 cfs
0 15 30 60 Meters


Revisit 2000 cfs
0 15 30 60 Meters

Reshaping the Channel and the Flow to Habitat Relationship



Lessons Learned

- Changes in sediment supply caused a shift in spawning habitat preference for Chinook
- Gravel placement has had minimal impacts on rearing habitat in the low flow channel
- Low flow augmentation in many cases has not persisted unless reinforced with hard points or oversized material
- Gravel placement or recruitment can alter the flow to habitat relationship
- Habitat gains due to gravel may only occur at specific flows